

EFFECTS OF BARIUM MOUTH WASHING ON SALIVARY (AMYLASE) AMONG ESAN POPULATION (EDO CENTRAL) OF NIGERIA.

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ABSTRACT

The effect of certain dentifrices on the activity of saliva amylase in subjects within Esan senatorial district of Edo state was investigated in this study with samples randomly collected from 45 volunteers. Subjects were divided into three groups and they used various dentifrice namely; Close-up toothpaste, Dabur toothpaste, Macleans toothpaste, chewing sticks made from *Garcinia manni*, *Azardiracta indica*, and *Xanthophyllum zanthioides*. Standard colorimetric method was used for the determination of amylase activity. It was found that the mean \pm standard deviation values were obtained from Group I subjects: basal samples, 1432.5 ± 518.3 U/L, *Garcinia manni* samples, 1247.2 ± 728.8 U/L and Close-up toothpaste samples, 2258.9 ± 762.7 U/L. for Group II subjects: basal samples, 1342.6 ± 230.9 U/L, *Azardiracta indica* samples, 1263.1 ± 90.3 U/L and Dabur toothpaste samples, 2323.1 ± 947 U/L. While Group III subjects: basal samples, 2003.1 ± 726.8 U/L, *Xanthophyllum zanthioides* samples, 1466.9 ± 245.8 U/L and Macleans toothpaste samples, 2698 ± 994.7 U/L. The mean of the activity of salivary amylase increased from the various basal samples in the three groups after the use of the various toothpaste, while a decrease was observed after the use of the various chewing sticks ($p < 0.05$).

KEYWORDS: Effect, Mouth, Washing, Salivary (Amylase). Esan,

INTRODUCTION

Food ingestion through the mouth is mechanically broken down by the action of the teeth and chemically broken down by the activity of saliva (Van De Graff and Fox, 1999), produced by the salivary gland which are both accessory digestive organs.

The teeth, is one of the hard, conical structures set in the alveoli of the upper and lower jaws, used in mastication and assisting also in articulation (Stedman's Medical Dictionary, 1975). The teeth of humans and mammals vary in structure and are adapted to handle food in different ways and so, is an important organ for digestion of food. The state of the teeth is said to affect an individual's appearance and so the health of the teeth is paramount, making the act of dental cleaning, widely practiced.

The use of various dentifrices, which are tooth powders, toothpaste, tooth washes (any preparation used in the cleansing of the teeth), (Stedman's Medical Dictionary, 1975), can be dated back to 5000 years ago in Egypt, China and India to promote general oral hygiene. The most common dentifrice used up to date are: toothpaste, which in the developed countries is considered a necessity and used at least twice a day. Common examples include Pepsodent, Close-up, Maclean's Colgate etc (Van De Graff and fox, 1999). No significant study has been carried out to find out the effect of barium mouth washing on salivary amylase. Therefore, this study aims at determining the effect of certain dentifrices on the activity of salivary amylase in individuals within Esan senatorial district of Edo state.

MATERIALS AND METHODS

CHEWING STICK

The chewing sticks used were purchased from a hawker of the chewing stick in new market Ekpoma. All the subjects used chewing sticks from the same sources.

TOOTHPASTE- The various toothpaste (Close up, Macleans, Dabur) were bought from precious supermarket in market square Ekpoma and all the various toothpastes from the same source.

SUBJECTS- Forty five healthy volunteers (15 females and 30 males) aged 13-52 years, with no apparent dental carries or gingivitis participated in this investigation. All subjects used in this study gave their verbal and written consent to participate before recruitment into the study. The subjects were divided into three groups with 15 in each group.

GROUP 1

Fifteen (15) subjects used chewing stick made from *Garcinia manni* (bitter kola stem) “Edu” in Edo and three days later they used Close-up toothpaste.

GROUP 2

Fifteen (15) subjects used chewing stick made from *Azadirachta indica*, “Dangoyaro” in Hausa and three days later they used Dabur toothpaste.

GROUP 3

Fifteen (15) subjects used chewing stick made from *Xanthoxylum zanthoxyloides*, and three days later they used Macleans toothpaste.

COLLECTION OF SALIVA

BASAL SAMPLE- Whole saliva was collected from the subjects in each group in the morning (6:30 am and 7:30am) after fasting over night. Before collection of saliva, participants were asked to rinse their mouth with water. The saliva produced during the first 2 minutes after the water rinse was expectorated. Then saliva was collected at two minutes intervals for six minutes. The accumulation saliva was for subsequent test.

CHEWING STICK SAMPLE- After the subject have chewed the respective chewing sticks for 2 minutes before collection of saliva, participants were asked to rinse their mouth with water and then collection of saliva was proceeded as above.

TOOTHPASTE SAMPLES- After the subjects brushed their mouth with the respective toothpaste, participants were asked to rinse their mouth with water and then saliva was collected as in the basal sample.

DETERMINATION OF SALIVARY AMYLASE

The colorimetric method as reported by Kaufman and Norbert (1980) was employed.

PRINCIPLE- The method uses benzylidene blocked p-nitrophenylmaltoheptaoside as substrate. Two indicator enzymes glucoamylase, to cleave the amylase reaction products, and alpha-glucosidase to release the p-nitrophenol., the colour developed is read calorimetrically at 420nm.

STATISTICAL ANALYSIS

The statistical parameters used in analyzing the data generated include, analysis of variance (ANOVA), differences in mean were tested using the Tukey test and student –“t”- test. Data were considered significant at $P < 0.05$ using the F- distribution, q distribution and “t” value tables for ANOVA, Tukey and student-“t”-test respectively.

RESULTS/DISCUSSION

In this research results were obtained from 45 subjects comprising of 15 female and 30 male volunteers resident in Esan Metropolis. The age bracket in this case study was between 13-52 years.

The mean \pm SD of salivary amylase activity in subjects exposed to the various dentifrices is shown in Table 1

TABLE 1: MEAN \pm SD OF SALIVARY AMYLASE ACTIVITY IN BASAL SAMPLES (PRE- USE) AND IN SAMPLES OBTAINED POST- USE OF THE VARIOUS DENTIFRICES

DENTIFRICES						
GROUP I		GROUP II		GROUP III		
Garcinia	Close-up	Azardiracha	Dabur	Xanthophyllum	Macleans	
Manni	toothpaste	indica	toothpaste	zanthyloides	toothpaste	
SAMPLE	U / L	U / L	U / L	U / L	U / L	U / L
Basal sample						
(Pre-use)	1432.5±518.3	1432.5 ±518.3	1342.6±230.9	1342.6±230.9	2003.1±726.8	
Post-use						
Dentifrice	1247.2±728.8	2258.9±762.7	1263.1±90.3	2323.1±947.0	1466.9±245.8	
2698.8±994.7						

From table 1, the mean \pm SD of salivary amylase activity in basal samples in Group I, Group II, and Group III individuals were 1432.5 \pm 518.3 U / L, 1342.6 \pm 230.9U / L and 20003.1 \pm 726.8U / L respectively, while that obtained after the use of the various dentifrices, Garcina manni, Close-up toothpaste, Azardiracha indica, Dabur toothpaste, Xanthophyllum zanthylodes, and Macleans toothpaste were 1247.2 \pm 728.8U / L, 2258.9 \pm 627.0U / L, 1263.1 \pm 90.3U / L, 2323.1 \pm 94.0U / L, 1466.9 \pm 245.8U / L and 2698.8 \pm 994.7U / L respectively.

TABLE 2: COMPARISON OF SALIVARY AMYLASE ACTIVITY IN GROUP I USING TURKEY TEST.

Comparison	Difference	S E	q	q0.05(42,2)	p-value
A vs B	XA = XB				
1 vs 2	185.3	153.8	1.2048	2.858	NS
3 vs 1	826.4	153.8	5.3732	2.858	p<0.05
3 vs 2	1,011.7	153.8	6.5780	2.858	p<0.05

The purpose of this study was to determine the effect of certain dentifrices on saliva amylase activity in residents of Esan metropolis. The following mean \pm standard deviation values were obtained from Group 1 subjects: basal samples, 1432.5 \pm 518.3 U/L, *Garcinia manni* samples, 1247.2 \pm 728.8 U/L and close-up toothpaste samples 2258.9 \pm 762.7 U/L.

For Group II subjects:

basal samples, 1342.6 ± 230.9 U/L, Azadirachta indica samples, 1263.1 ± 90.3 U/L and Dabur toothpaste samples, 2323.1 ± 947 U/L while Group III subjects: basal samples, 2003.1 ± 726.8 U/L, *Xanthophyllum zanthioides* samples, 1466.9 ± 245.8 U/L, macleans toothpaste samples and 2698 ± 994.7 U/L.

The mean of the activity of salivary amylase increased from the various basal samples in the three groups after the use of the various toothpastes while a decrease was observed after the use of the various chewing sticks.

The analysis of variance (ANOVA) and the student-t-test were used to determine whether there was a significant difference in mean in the different groups and all the groups combined at $p < 0.05$. The result of the ANOVA and student-t-test showed that there was a significant difference in the various groups and all the groups combined. Comparison of salivary amylase activity using the Tukey test showed that there was a significant difference in the activity of salivary amylase at $p < 0.05$ between basal sample and the various toothpaste samples and *Xanthophyllum zanthioides* sample, the chewing stick samples and the toothpaste samples except between the Close-up and *Xanthophyllum zanthioides* samples (Akande 1998).

Ernest Newbrum (1962) observed that there was a pronounced variation in amylase content of saliva between individuals. Also Davies (1972), Ferguson and Fort (1974), Ferguson *et al* (1973) observed a circadian variation in unstimulated saliva in flow rate, pH and some salivary constituents which explains the variety of salivary amylase recorded. (Adekunle and Odukoya 2006)

The increase in the activity of salivary amylase after use of the various toothpaste which was significant compares favorably with the result reported by Boro *et al* (1984), that fluoride; the active ingredient in toothpaste, increases the activity of salivary amylase. Also Allman *et al* (1985) noted that the injection of NaF solution into rats causes the stimulation of amylase secretion further supporting the result obtained. Other investigators Shahed and Allman (1988) suggested that the stimulation of amylase secretion from parotid gland cells by NaF may be mediated by an increase in cellular cAMP concentration, which exerts its effect, at least in part by increasing the activity of cAMP dependent protein kinase.

Zhang and Rashket (1998) reported that black and green teas inhibited salivary amylase, hence the lack of the significance in the difference in mean between the basal sample and samples of chewing sticks made from *Garcinia manni* and *Azadirachta indica* which could be due to the presence of these derivatives in these chewing sticks. The significant difference in mean between the basal samples and *Xanthophyllum zanthioides* could be that tannin and saponin is absent in this chewing stick.

Hara and Yu (1995), observed that fluoride concentration at and above 5×10^{-2} M inhibited salivary amylase, proposing that the fluoride content in the various toothpaste were not up to the above concentration since the amylase activity was increased. The presence of calcium as an ingredient of toothpaste accounts for the increase in amylase activity in the results which agree with the report of Mermall *et al* (1973).

In conclusion, the present study has revealed that the use of fluoride containing toothpaste increases the activity of salivary amylase and hence increases the rate of digestion of starch which is beneficial to Africans, since bulk of our diet is made up of starch.

CONCLUSION

The practice of the brushing of teeth with fluoride containing toothpaste is greatly encouraged while the use of chewing stick such as *Garcinia manni* and *Azadirachta indica* do not have any significant effect on the salivary amylase hence their use should be discouraged as regards the rate of starch digestion.

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Received for Publication: 12/08/2009

Accepted for Publication: 21/09/2009

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